

Remarks/Arguments:

Claims 1, 9 and 14 have been amended. No new matter is introduced herein. Claims 1-7, 9, 10 and 12-14 are pending.

Applicant acknowledges with thanks the courtesy extended to Applicant's representative by Examiner Budd during the Telephone Interview of September 26, 2007. During the course of the interview, Applicant's representative discussed the differences between the cited art and Applicant's invention as recited by Applicant's proposed amendment. Namely, that Applicant's amended feature of first and second dielectric films having substantially a same geometric shape is neither disclosed nor suggested by Suzuki (JP 62-81807).

Claims 1-7, 9, 10 and 12-14 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki (JP 62-81807) in view of Shibata et al. (U.S. Patent No. 6,556,103). It is respectfully submitted, however, that these claims are patentable over the cited art for the reasons set forth below.

Claim 1, as amended, includes features neither disclosed nor suggested by the cited art, namely:

...the first dielectric film and the second dielectric film have...a substantially same geometric shape...

...a ratio of a sum of a thickness (ts) of the first dielectric film and the second dielectric film to the thickness (tp) of the piezoelectric plate is provided in a range such that an electro-mechanical coupling factor is substantially constant ...

...the range of the ratio (ts/tp) is between 0.7 and 2.0, inclusive ...(Emphasis Added)

Claims 9 and 14 includes similar recitations. Basis for the amendment can be found, for example, at page 2, lines 24-25 and Fig. 1 of the original specification. Claims 1, 9 and 14 have also been amended to clarify the language.

Suzuki discloses, in Figs. 1 and 2(e), a piezoelectric thin film resonator having an upper electrode 8 and a lower electrode 6. A dielectric film 5 is formed on lower electrode 6 and a dielectric film 9 is formed on an upper electrode 8 (Abstract). As acknowledged by the Examiner, Suzuki does not disclose or suggest "a ratio of a sum of a thickness (ts) of the first ... and the second dielectric film to the thickness (tp) of the piezoelectric plate is provided in a range ... the range of the ratio (ts/tp) is between 0.7 and 2.0, inclusive" (Emphasis Added). In addition, Suzuki does not disclose or suggest Applicant's claimed feature of "the first dielectric film and the second dielectric film have...a substantially same geometric shape" (emphasis added). Instead, as shown in Fig. 2(e) of Suzuki, dielectric films 5 and 9 have different shapes. Accordingly, Suzuki does not include all of the features of claim 1.

Shibata et al. disclose, in Figs. 3 and 4, a piezoelectric resonator that includes piezoelectric thin film 18, dielectric thin films 14 and electrode thin films 16 (col. 5, lines 48-56). Shibata et al. further disclose that SiO₂ is used to form dielectric thin films 14 and ZnO is used as piezoelectric thin film 18 (col. 5, lines 57-58 and col. 5, lines 61-62). Shibata et al. do not disclose or suggest Applicant's claimed features of "the first dielectric film and the second dielectric film have...a substantially same geometric shape" or "a ratio of a sum of a thickness (ts) of the first dielectric film and the second dielectric film to the thickness (tp) of the piezoelectric plate ... the range of the ratio (ts/tp) is between 0.7 and 2.0, inclusive" (Emphasis Added). These features are neither disclosed nor suggested by Shibata et al.

The Examiner asserts, on p. 3 of the Office Action, that Shibata et al. disclose a ratio of 1.89 (col. 7, line 54) and 1.83 (col. 12, line 25). Applicant respectfully disagrees. At col. 7, lines 53-54, Shibata et al. disclose a "SiO₂ film thickness/ZnO film thickness is about 0.53." Accordingly, the SiO₂ dielectric film thickness 14 corresponds to Applicant's claimed thickness "ts" and the ZnO piezoelectric film thickness 18 corresponds to Applicant's claimed thickness "tp." Thus, at col. 7, line 54, Shibata et al. recite a ratio of "ts/tp" of 0.53. At col. 12, lines 24-25, Shibata et al. recites "SiO₂/Al/ZnO/Al/SiO₂ = 0.3/0.1/1.1/0.1/0.3." Accordingly, the thickness "ts" of dielectric films 14 is equal to 0.3 + 0.3 or 0.6 and the thickness "tp" of piezoelectric film 18 is 1.1. Thus, at col. 12, lines 24-25, Shibata et al. recite a ratio "ts/tp" of 0.55. Accordingly, Shibata et al. do not disclose or suggest a thickness ratio ts/tp between 0.7 and 2.0, inclusive, as recited in claim 1. Thus, Shibata et al. do not include all of the features of claim 1 and do not make up the deficiencies of Suzuki. Accordingly, allowance of claim 1 is respectfully requested.

Claims 2-7 include all of the features of claim 1 from which they depend. Accordingly, claims 2-7 are also patentable over the cited art.

Amended claims 9 and 14, although not identical to claim 1, includes features similar to claim 1 that are neither disclosed nor suggested by the cited art. Namely, that 1) the first dielectric film and the second dielectric film have a substantially same geometric shape and that 2) a ratio t_s/t_p of the dielectric film thickness to the piezoelectric film thickness is provided in a range such that an electro-mechanical coupling factor is substantially constant, where the ratio t_s/t_p is between 0.7 and 2.0, inclusive. Accordingly, allowance of claims 9 and 14 is respectfully requested for at least the same reasons as for claim 1.

Claims 10, 12 and 13 include all of the features of claim 9 from which they depend. Accordingly, claims 10, 12 and 13 are also patentable over the cited art.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,

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